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Mood, Alexithymia, Dispositional Mindfulness, Sensitivity to Reward and Punishment, Frontal Systems Functioning and Impulsivity in Clients Undergoing Treatment for Substance Dependence

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Background: Neurobiological perspectives on addiction have emphasised the intertwined roles of (1) the subcortical dopaminergic reward system as a motivational driver of excessive substance use (Koob & LeMoal, 1997) and (2) prefrontal cortex dysfunction as the basis of the impaired self-control that characterises addictive behaviour (Lyvers, 2000). Traits presumed to reflect the functioning of these brain systems include reward sensitivity, presumed to index the motivational influence of the dopaminergic reward system, and traits such as rash impulsivity, disinhibition, executive deficit and alexithymia, all of which have been linked to inherent deficiencies of prefrontal cortex functioning as well as risky or problematic substance use (Dawe et al., 2004; Lyvers et al., 2012). Further, dispositional mindfulness has been suggested to protect against addictions, appears to reflect meta-cognitive functioning (Chambers et al., 2009) and is inversely related to impulsivity and other behavioural indices of frontal systems dysfunction (Lyvers et al., in press). The present study compared residential addiction treatment in-patients to community controls on measures of the above traits, with the expectation that addicts and controls would differ on all measures. **Methods.** After excluding those with major psychiatric disorders, 100 residents of two therapeutic communities undergoing in-patient addiction treatment and 107 social drinker controls completed the following indices: *Depression Anxiety Stress Scales -21* (*DASS-21*; Lovibond & Lovibond, 1995), *Frontal Systems Behavior Scale* (*FrSBe*; Grace & Malloy, 2001), *Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ:* Torrubia et al., 2001), *Mindful Attention Awareness Scale* (*MAAS*; Brown & Ryan, 2003), *Barratt Impulsiveness Scale* (*BIS-11*; Patton et al., 1995) , *Toronto Alexithymia Scale-20* (*TAS-20*; Bagby et al., 1994) as well as demographic items.

Results: Multivariate analysis of covariance (MANCOVA) controlling for age, education, previous serious head injury and gender revealed highly significant differences ($p < .0001$) between clinical and control groups on all dependent measures. The clinical group scored significantly higher on depression, anxiety, stress, alexithymia, frontal systems dysfunction, reward sensitivity, punishment sensitivity and impulsivity, and lower on dispositional mindfulness, than the control group. Time in treatment was significantly correlated only with levels of depression, anxiety and stress, supporting the relative stability of the trait measures. Group differences (all $p < .0001$) are shown in the following table.

	Addicts		Controls	
	M	SD	M	SD
DASS Depression	8.70	6.13	3.39	3.85
DASS Anxiety	6.40	5.04	2.87	3.13
DASS Stress	9.77	5.23	5.72	4.01
BIS-11 Total	75.28	13.06	69.40	6.27
Reward Sensitivity	14.49	4.88	11.23	4.15
Punishment Sensitivity	13.33	5.42	9.99	5.14
MAAS Mindfulness	50.45	14.30	58.66	12.21
FrSBe - Apathy	39.00	5.87	29.24	6.50
FrSBe - Disinhibition	42.22	8.24	32.26	6.63
FrSBe – Exec Dysfunction	46.58	8.38	37.45	8.16

Conclusions: Results are consistent with the notion that substance use disorders are linked to reward system and frontal lobe dysfunction and associated traits, although the current findings cannot determine whether such characteristics predated or post-dated disordered substance use.

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